

II. Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-29 (canceled)

30. (currently amended) A reaction apparatus, comprising
the a reaction vessel according to Claim 2, comprising
a reaction vessel main body equipped with a reaction chamber having an
opening and capable of holding a reaction solution, and
a cover member capable of sealing the opening of the reaction chamber,
a temperature controller,
a light source, and
a fluorescent light detector,
wherein the cover member and the reaction chamber have a contact surface that comes
into contact with the reaction solution held in the reaction chamber in a state in which the cover
member is mounted on the reaction vessel main body,
wherein the cover member is made of a light transmitting material so that light can pass
from the reaction solution held in the reaction chamber, through the contact surface of the cover
member, to the outside of the reaction vessel, or the reaction vessel main body is made of a
light transmitting material so that light can pass from the reaction solution held in the reaction
chamber, through the contact surface of the reaction chamber, to the outside of the reaction
vessel,
wherein the cover member is made of a light transmitting material so that light can pass
from the outside of the reaction vessel, through the contact surface of the cover member, to the
reaction solution held in the reaction chamber, or the reaction vessel main body is made of a
light transmitting material so that light can pass from the outside of the reaction vessel, through
the contact surface of the reaction chamber, to the reaction solution held in the reaction
chamber,
wherein the temperature controller is attached to the cover member and/or the reaction
vessel main body so that temperature of the reaction solution held in the reaction chamber can
be controlled through the contact surface of the cover member and/or the contact surface of the
reaction chamber,

the light source is provided so that the reaction solution held in the reaction chamber can be irradiated with light through the contact surface of the cover member and/or the contact surface of the reaction chamber, and

the fluorescent light detector is provided so that fluorescent light emitted from the reaction solution held in the reaction chamber can be detected through the contact surface of the cover member and/or the contact surface of the reaction chamber.

31. (original) The reaction apparatus according to Claim 30, wherein the temperature controller is attached to the wall component of substantially uniform thickness that constitutes the cover member and that has the contact surface of the cover member, and/or the wall component of substantially uniform thickness that constitutes the reaction vessel main body and that has the contact surface of the reaction chamber.

32. (currently amended) A reaction apparatus, comprising
the a reaction vessel according to Claim 13, comprising
a reaction vessel main body equipped with a reaction chamber having an
opening and capable of holding a reaction solution, and
a cover member capable of sealing the opening of the reaction chamber,
a temperature controller,
a light source, and
a fluorescent light detector,
wherein the cover member and the reaction chamber have a contact surface that comes
into contact with the reaction solution held in the reaction chamber in a state in which the cover
member is mounted on the reaction vessel main body,
wherein the cover member is made of a light transmitting material so that light can pass
from the reaction solution held in the reaction chamber, through the contact surface of the cover
member, to the outside of the reaction vessel, or the reaction vessel main body is made of a
light transmitting material so that light can pass from the reaction solution held in the reaction
chamber, through the contact surface of the reaction chamber, to the outside of the reaction
vessel,
wherein the reaction chamber has an opposing surface opposite the contact surface of
the cover member, and when the cover member is mounted on the reaction vessel main body,
all or part of the reaction solution held in the reaction chamber is held in the form of a thin layer

between the contact surface of the cover member and the opposing surface of the reaction chamber,

wherein the reaction chamber has an enveloping surface that envelops the reaction solution present between the contact surface of the cover member and the opposing surface of the reaction chamber,

wherein when the cover member is mounted on the reaction vessel main body, a tightly closed space is formed by the contact surface of the cover member, the opposing surface of the reaction chamber, and the enveloping surface of the reaction chamber, and all or part of the reaction solution is held in the form of a thin layer within the tightly closed space, and

wherein

the temperature controller is attached to the cover member and/or the reaction vessel main body so that temperature of the reaction solution held in the reaction chamber can be controlled through the contact surface of the cover member and/or the opposing surface of the reaction chamber,

the light source is provided so that the reaction solution held in the reaction chamber can be irradiated with light through the enveloping surface of the reaction chamber, and

the fluorescent light detector is provided so that fluorescent light emitted from the reaction solution held in the reaction chamber can be detected through the enveloping surface of the reaction chamber.

33. (original) The reaction apparatus according to Claim 32, wherein the temperature controller is attached to the wall component of substantially uniform thickness that constitutes the cover member and that has the contact surface of the cover member, and/or the wall component of substantially uniform thickness that constitutes the reaction vessel main body and that has the opposing surface of the reaction chamber.

34. (original) The reaction apparatus according to Claim 32, further comprising a plurality of optical fibers disposed around the enveloping surface of the reaction chamber,

wherein the irradiation of the reaction solution with light from the light source and/or the detection of fluorescent light emitted from the reaction solution is accomplished by utilizing the optical fibers.

35. (currently amended) A reaction apparatus, comprising
- a reaction vessel installation part in which the a reaction vessel according to Claim 18 is installed, the reaction vessel comprising
- a reaction vessel main body equipped with a reaction chamber having an opening and capable of holding a reaction solution, and
- a cover member capable of sealing the opening of the reaction chamber,
- a first temperature controller,
- a second temperature controller,
- a light source, and
- a fluorescent light detector,
- wherein the cover member and the reaction chamber have a contact surface that comes into contact with the reaction solution held in the reaction chamber in a state in which the cover member is mounted on the reaction vessel main body,
- wherein the cover member is made of a light transmitting material so that light can pass from the reaction solution held in the reaction chamber, through the contact surface of the cover member, to the outside of the reaction vessel, or the reaction vessel main body is made of a light transmitting material so that light can pass from the reaction solution held in the reaction chamber, through the contact surface of the reaction chamber, to the outside of the reaction vessel,
- wherein a tightly closed space is formed by the contact surface of the reaction chamber and the contact surface of the cover member when the cover member is mounted on the reaction vessel main body, and all or part of the reaction solution is held in the tightly closed space,
- wherein a nozzle tip fitting space, into which a nozzle tip mounted on a nozzle capable of the intake and discharge of a liquid can be fitted, is formed in the cover member, and a nozzle tip fitting hole leading to the nozzle tip fitting space is formed so as to allow the nozzle tip to be fitted into the nozzle tip fitting space while the cover member is mounted on the reaction vessel main body,
- wherein a through-hole communicating between the outside of the reaction vessel, the tightly closed space, and the nozzle tip fitting space can be formed in the reaction vessel main body and the cover member by a puncture needle provided on the outside of the reaction vessel while the cover member is mounted on the reaction vessel main body,

wherein the first temperature controller is provided so that the temperature of the reaction solution held in the tightly closed space of the reaction vessel installed in the reaction vessel installation part can be controlled through the contact surface of the reaction chamber,

the second temperature controller is removably mounted in the nozzle tip fitting space of the cover member and provided so that the temperature of the reaction solution held in the tightly closed space of the reaction vessel installed in the reaction vessel installation part can be controlled through the contact surface of the cover member,

the light source is provided so that the reaction solution held in the tightly closed space of the reaction vessel installed in the reaction vessel installation part can be irradiated with light through the contact surface of the cover member and/or the contact surface of the reaction chamber, and

the fluorescent light detector is provided so that fluorescent light emitted from the reaction solution held in the tightly closed space of the reaction vessel installed in the reaction vessel installation part can be detected through the contact surface of the cover member and/or the contact surface of the reaction chamber.

36. (currently amended) A reaction apparatus, comprising
a reaction vessel installation part in which ~~the a~~ reaction vessel ~~according to Claim 19~~ is installed, the reaction vessel comprising

a reaction vessel main body equipped with a reaction chamber having an opening and capable of holding a reaction solution, and

a cover member capable of sealing the opening of the reaction chamber,

a first temperature controller,

a second temperature controller,

a light source, and

a fluorescent light detector,

wherein the cover member and the reaction chamber have a contact surface that comes into contact with the reaction solution held in the reaction chamber in a state in which the cover member is mounted on the reaction vessel main body,

wherein the cover member is made of a light transmitting material so that light can pass from the reaction solution held in the reaction chamber, through the contact surface of the cover member, to the outside of the reaction vessel, or the reaction vessel main body is made of a light transmitting material so that light can pass from the reaction solution held in the reaction

chamber, through the contact surface of the reaction chamber, to the outside of the reaction vessel,

wherein the reaction chamber has an opposing surface opposite the contact surface of the cover member, and when the cover member is mounted on the reaction vessel main body, all or part of the reaction solution held in the reaction chamber is held in the form of a thin layer between the contact surface of the cover member and the opposing surface of the reaction chamber,

wherein the reaction chamber has an enveloping surface that envelops the reaction solution present between the contact surface of the cover member and the opposing surface of the reaction chamber,

wherein when the cover member is mounted on the reaction vessel main body, a tightly closed space is formed by the contact surface of the cover member, the opposing surface of the reaction chamber, and the enveloping surface of the reaction chamber, and all or part of the reaction solution is held in the form of a thin layer within the tightly closed space,

wherein a nozzle tip fitting space, into which a nozzle tip mounted on a nozzle capable of the intake and discharge of a liquid can be fitted, is formed in the cover member, and a nozzle tip fitting hole leading to the nozzle tip fitting space is formed so as to allow the nozzle tip to be fitted into the nozzle tip fitting space while the cover member is mounted on the reaction vessel main body,

wherein a through-hole communicating between the outside of the reaction vessel, the tightly closed space, and the nozzle tip fitting space can be formed in the reaction vessel main body and the cover member by a puncture needle provided on the outside of the reaction vessel while the cover member is mounted on the reaction vessel main body, and

wherein

the first temperature controller is provided so that the temperature of the reaction solution held in the tightly closed space of the reaction vessel installed in the reaction vessel installation part can be controlled through the opposing surface of the reaction chamber,

the light source is provided so that the reaction solution held in the tightly closed space of the reaction vessel installed in the reaction vessel installation part can be irradiated with light through the enveloping surface of the reaction chamber, and

the fluorescent light detector is provided so that fluorescent light emitted from the reaction solution held in the tightly closed space of the reaction vessel installed in the

reaction vessel installation part can be detected through the enveloping surface of the reaction chamber.

37. (original) The reaction apparatus according to Claim 36, further comprising a plurality of optical fibers disposed around the enveloping surface of the reaction chamber,

wherein the irradiation of the reaction solution with light from the light source and/or the detection of fluorescent light emitted from the reaction solution is accomplished by utilizing the optical fibers.

38. (original) The reaction apparatus according to Claim 35, further comprising a temperature controller mounting and removing part for mounting and removing the second temperature controller in the nozzle tip fitting space,

wherein the temperature controller mounting and removing part performs an operation for mounting the second temperature controller in the nozzle tip fitting space prior to the reaction, and operation for removing the second temperature controller from the nozzle tip fitting space after the reaction.

39. (original) The reaction apparatus according to Claim 35, further comprising a puncture vessel installation part in which a puncture vessel is installed, a nozzle capable of the intake and discharge of a liquid, and a nozzle transfer part,

wherein the puncture vessel comprises a liquid holding space capable of holding a liquid, an opening that leads to the liquid holding space, and a puncture needle,

the liquid holding space is formed so that the reaction vessel can be accommodated in the liquid holding space through the opening,

the puncture needle is provided so as to protrude into the liquid holding space from the wall component of the puncture vessel forming the liquid holding space,

the nozzle transfer part performs an operation for fitting the nozzle tip mounted on the nozzle in the nozzle tip fitting space of the reaction vessel installed in the reaction vessel installation part, operation for transferring the reaction vessel with the mounted nozzle tip fitted thereinto to the puncture vessel installation part, and operation for accommodating the reaction vessel in the liquid holding space of the puncture vessel installed puncture vessel installation part, and for forming in the cover member and the reaction vessel main body, by means of the puncture needle provided in the puncture vessel, a through-hole that communicates with the

nozzle tip fitting space, the tightly closed space of the reaction vessel, and the liquid holding space of the puncture vessel, and

the nozzle performs an operation for extracting the reaction solution held in the tightly closed space of the reaction vessel into the liquid held in the liquid holding space of the puncture vessel, by the intake and discharge of the liquid through the through-hole.

40. (previously presented) The reaction apparatus according to Claim 30, being a reaction apparatus for PCR.

41-44 (canceled)